



Jet Propulsion Laboratory
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“Look and you will find it –
what is unsought will go
undetected.” - Sophocles

Content-based On-board Summarization to Monitor Infrequent Change

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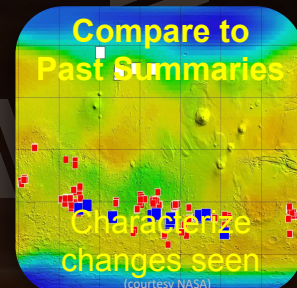
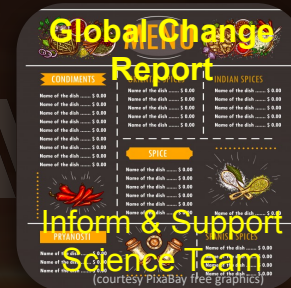
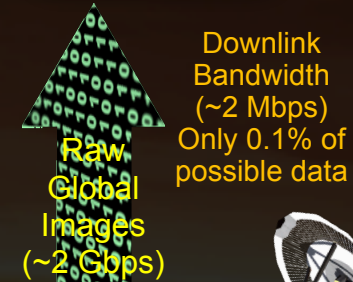
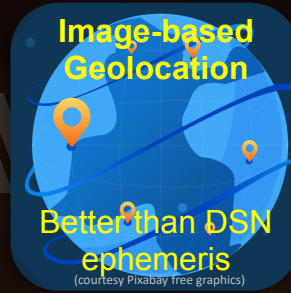
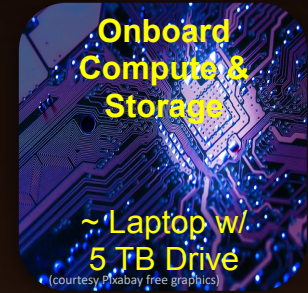
RPC 122 - Virtual Research Presentation Conference

Program: Strategic Initiative (6x)

Assigned Presentation #18

Poster #62

Innovation: Onboard Summarization for Science



Innovative Concepts

- Leverage Upcoming Space Computing
- Leave camera on & process everything
- Trustable science autonomy
- Store content-based summarizations
- Perform change detection between summaries
- Can now trade onboard compute for bandwidth!
- Many kinds of change can be captured
- Camera + compute + COSMIC is new smart instrument!

Scientists in Control

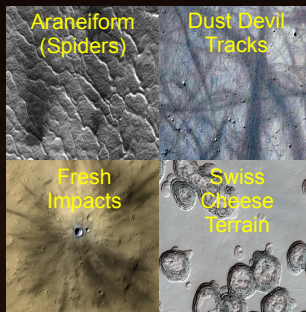
- Scientists reconfigure COSMIC on-the-fly
- COSMIC sends reports on global change
- **Scientists more informed** to react:
 - Request targeting of observed change?
 - Request tiny snapshots already waiting?
 - Request high-res monitoring of a site?
- Miss a comm pass? COSMIC keeps working.

Change Detection Capabilities & Progress

Known Science Targets

(surface classification)

- Know what, but not where/when
- Can look for any surface feature
- Needs example images for training
- Alerts provide time/space map
- Works on entire globe



TRL ~5

- Tested on entire CTX database
- Actual science discoveries attained!
- Related task infused into PDS archive
- Ready for flight-oriented maturation

Agnostic Change Detection

(image-summary-based change)

- Don't know what, where, or when
- Discover new transients
- Global reports on change characterization
- Agnostic to expectation or known targets



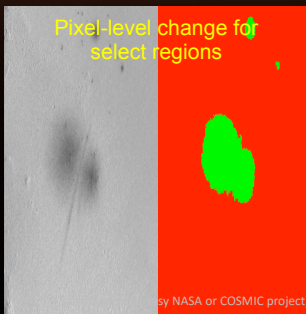
TRL ~3

- Feasibility study complete on real data
- Computational goals met
- New change-detection req: Stability
- Refinement needed for specific science use-cases and rigorous V&V

Region Monitoring

(Pixel change for small areas)

- Know where, but not what/when
- Classical change detection
- Only a ~1k small regions at a time
- Alerts when something starts to happen



TRL ~3.5

- Excellent performance on small tests using real & synthetic data
- Tolerant to expected operational environment
- Ready for rigorous V&V